ADTRAN

DSU 56/64
Data Service Unit

User Manual

Part Number 1200062L1

The following conventions are used in this manual.

NOTE *Notes provide additional useful information.*

CAUTION *Cautions signify information that could prevent service interruption.*

WARNING *Warnings provide information that could prevent damage to the equipment or endangerment to human life.*

Important Safety Instructions

When using your telephone equipment, please follow these basic safety precautions to reduce the risk of fire, electrical shock, or personal injury:

1. Do not use this product near water, such as near a bathtub, wash bowl, kitchen sink, laundry tub, in a wet basement, or near a swimming pool.
2. Avoid using a telephone (other than a cordless-type) during an electrical storm. There is a remote risk of shock from lightning.
3. Do not use the telephone to report a gas leak in the vicinity of the leak.
4. Use only the power cord, power supply, and/or batteries indicated in the manual. Do not dispose of batteries in a fire. They may explode. Check with local codes for special disposal instructions.

Save These Important Safety Instructions

Affidavit Requirements for Connection to Digital Services

- An affidavit is required to be given to the telephone company whenever digital terminal equipment without encoded analog content and billing protection is used to transmit digital signals containing encoded analog content which are intended for eventual conversion into voice band analog signal and transmitted on the network.

- The affidavit shall affirm that either no encoded analog content or billing information is being transmitted or that the output of the device meets Part 68 encoded analog content or billing protection specification.

- End user/customer will be responsible to file an affidavit with the local exchange carrier when connecting unprotected CPE to a 1.544 Mbps or subrate digital service.

- Until such time as subrate digital terminal equipment is registered for voice applications, the affidavit requirements for subrate services are waived.

Affidavit for Connection of Customer Premises Equipment to 1.544 MBPS and/or Subrate Digital Services

For the work to be performed in the certified territory of _____ (telco name)

State of _____

County of _____

I, _____ (name), _____ (business address), _____ (telephone number) being duly sworn, state:

I have the responsibility for the operation and maintenance of the terminal equipment to be connected to 1.544 Mbps and/or _____ subrate digital services. The terminal equipment to be connected complies with Part 68 of the FCC rules except for the encoded analog content and billing protection specification. With respect to encoded analog content and billing protection:

( ) I attest that all operations associated with the establishment, maintenance and adjustment of the digital CPE with respect to encoded analog content and billing protection information continuously complies with Part 68 of the FCC rules and Regulations.

( ) The digital CPE does not transmit digital signals containing encoded analog content or billing information which is intended to be decoded within the telecommunications network.

( ) The encoded analog content and billing protection is factory set and is not under the control of the customer.

I attest that the operator(s) maintainer(s) of the digital CPE responsible for the establishment, maintenance and adjustment of the encoded analog content and billing information has (have) been trained to perform these functions by successfully having completed one of the following (check appropriate blocks):

( ) A. A training course provided by the manufacturer/grantee of the equipment used to encode analog signals; or

( ) B. A training course provided by the customer or authorized representative, using training materials and instructions provided by the manufacturer/grantee of the equipment used to encode analog signals; or

( ) C. An independent training course (e.g., trade school or technical institution) recognized by the manufacturer/grantee of the equipment used to encode analog signals; or

( ) D. In lieu of the proceeding training requirements, the operator(s)/maintainer(s) is (are) under the control of a supervisor trained in accordance with _____ (circle one) above.

I agree to provide _____ (telco's name) with proper documentation to demonstrate compliance with the information in the preceding paragraph, if so requested.

_____ Signature

_____ Title

_____ Date

Subscribed and sworn to before me

This _____ day of _____, 20__

_____
Notary Public

My commission expires: _____

FCC regulations require that the following information be provided in this manual:

1. This equipment complies with Part 68 of the FCC rules. On the bottom of the equipment housing is a label that shows the FCC registration number and Ringer Equivalence Number (REN) for this equipment, if applicable. If required, this information must be given to the telephone company.
2. The following information may be required when applying to the local telephone company for leased line facilities.

Service Type	Digital Facility Interface Code	Service Order Code	Network Jacks
56 kbps Digital Interface	04DU5-56	6.0F	RJ-48S

3. An FCC compliant telephone cord with a modular plug may be provided with this equipment. This equipment is designed to be connected to the telephone network or premises wiring using a compatible modular jack, which is FCC Part 68 compliant. See Chapter 2, *Installation* on page 2-1 for details.
4. If this equipment causes harm to the telephone network, the telephone company may temporarily discontinue service. If possible, advance notification is given; otherwise, notification is given as soon as possible. The telephone company will advise the customer of the right to file a complaint with the FCC.
5. The telephone company may make changes in its facilities, equipment, operations, or procedures that could affect the proper operation of this equipment. If this happens, the telephone company will provide advance notification and the opportunity to make the necessary modifications to maintain uninterrupted service.
6. If experiencing difficulty with this equipment, please contact ADTRAN for repair and warranty information. If the equipment is causing harm to the network, the telephone company may request this equipment to be disconnected from the network until the problem is resolved or it is certain that the equipment is not malfunctioning.
7. This unit contains no user serviceable parts.
8. The FCC recommends that the AC outlet to which equipment requiring AC power is to be installed is provided with an AC surge arrester.

Federal Communications Commission Radio Frequency Interference Statement

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio frequencies. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Shielded cables must be used with this unit to ensure compliance with Class A FCC limits.

> **CAUTION**
>
> *Change or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.*

Canadian Emissions Requirements

This digital apparatus does not exceed the Class A limits for radio noise emissions from digital apparatus as set out in the interference-causing equipment standard entitled "Digital Apparatus," ICES-003 of the Department of Communications.

Cet appareil nuerique respecte les limites de bruits radioelectriques applicables aux appareils numeriques de Class A prescrites dans la norme sur le materiel brouilleur: "Appareils Numeriques," NMB-003 edictee par le ministre des Communications.

Canadian Equipment Limitations

Notice: The Canadian Industry and Science Canada label identifies certified equipment. This certification means that the equipment meets certain telecommunications network protective, operational, and safety requirements. The Department does not guarantee the equipment will operate to the user's satisfaction.

Before installing this equipment, users should ensure that it is permissible to be connected to the facilities of the local telecommunications company. The equipment must also be installed using an acceptable methods of connection. In some cases, the company's inside wiring associated with a single line individual service may be extended by means of a certified connector assembly (telephone extension cord). The customer should be aware that compliance with the above limitations may not prevent degradation of service in some situations.

Repairs to certified equipment should be made by an authorized Canadian maintenance facility designated by the supplier. Any repairs or alterations made by the user to this equipment, or equipment malfunctions, may give the telecommunications company cause to request the user to disconnect the equipment.

Users should ensure for their own protection that the electrical ground connections of the power utility, telephone lines and internal metallic water pipe system, if present, are connected together. This precaution may be particularly important in rural areas.

WARNING	*Users should not attempt to make such connections themselves, but should contract the appropriate electric inspection authority, or an electrician, as appropriate.*

The Load Number (LN) assigned to each terminal device denotes the percentage of the total load to be connected to a telephone loop which is used by the device, to prevent overloading. The termination on a loop may consist of any combination of devices subject only to the requirement that the total of the Load Numbers of all devices does not exceed 100.

Limited Product Warranty

ADTRAN warrants that for five (5) years from the date of shipment to Customer, all products manufactured by ADTRAN will be free from defects in materials and workmanship. ADTRAN also warrants that products will conform to the applicable specifications and drawings for such products, as contained in the Product Manual or in ADTRAN's internal specifications and drawings for such products (which may or may not be reflected in the Product Manual). This warranty only applies if Customer gives ADTRAN written notice of defects during the warranty period. Upon such notice, ADTRAN will, at its option, either repair or replace the defective item. If ADTRAN is unable, in a reasonable time, to repair or replace any equipment to a condition as warranted, Customer is entitled to a full refund of the purchase price upon return of the equipment to ADTRAN. This warranty applies only to the original purchaser and is not transferable without ADTRAN's express written permission. This warranty becomes null and void if Customer modifies or alters the equipment in any way, other than as specifically authorized by ADTRAN.

EXCEPT FOR THE LIMITED WARRANTY DESCRIBED ABOVE, THE FOREGOING CONSTITUTES THE SOLE AND EXCLUSIVE REMEDY OF THE CUSTOMER AND THE EXCLUSIVE LIABILITY OF ADTRAN AND IS IN LIEU OF ANY AND ALL OTHER WARRANTIES (EXPRESSED OR IMPLIED). ADTRAN SPECIFICALLY DISCLAIMS ALL OTHER WARRANTIES, INCLUDING (WITHOUT LIMITATION), ALL WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. SOMESTATES DO NOT ALLOW THE EXCLUSION OF IMPLIED WARRANTIES, SO THIS EXCLUSION MAY NOT APPLY TO CUSTOMER.

In no event will ADTRAN or its suppliers be liable to Customer for any incidental, special, punitive, exemplary or consequential damages experienced by either Customer or a third party (including, but not limited to, loss of data or information, loss of profits, or loss of use). ADTRAN is not liable for damages for any cause whatsoever (whether based in contract, tort, or otherwise) in excess of the amount paid for the item. Some states do not allow the limitation or exclusion of liability for incidental or consequential damages, so the above limitation or exclusion may not apply to Customer.

Customer Service, Product Support Information, and Training

ADTRAN will replace or repair this product within five years from the date of shipment if the product does not meet its published specification, or if it fails while in service.

A return material authorization (RMA) is required prior to returning equipment to ADTRAN. For service, RMA requests, training, or more information, see the toll-free contact numbers given below.

Presales Inquiries and Applications Support

Please contact your local distributor, ADTRAN Applications Engineering, or ADTRAN Sales:

Applications Engineering	(800) 615-1176
Sales	(800) 827-0807

Post-Sale Support

Please contact your local distributor first. If your local distributor cannot help, please contact ADTRAN Technical Support and have the unit serial number available.

Technical Support	(888) 4ADTRAN

The Custom Extended Services (ACES) program offers multiple types and levels of service plans which allow you to choose the kind of assistance you need. For questions, call the ACES Help Desk.

ACES Help Desk	(888) 874-2237

Repair and Return

If ADTRAN Technical Support determines that a repair is needed, Technical Support will coordinate with the Custom and Product Service (CAPS) department to issue an RMA number. For information regarding equipment currently in house or possible fees associated with repair, contact CAPS directly at the following number:

CAPS Department	(256) 963-8722

Identify the RMA number clearly on the package (below address), and return to the following address:

> ADTRAN Customer and Product Service
> 901 Explorer Blvd.
> Huntsville, Alabama 35806

RMA # _____

Training

The Enterprise Network (EN) Technical Training Department offers training on our most popular products. These courses include overviews on product features and functions while covering applications of ADTRAN's product lines. ADTRAN provides a variety of training options, including customized training and courses taught at our facilities or at your site. For more information about training, please contact your Territory Manager or the Enterprise Training Coordinator.

Training - phone	(800) 615-1176, ext. 7500
Training - fax	(256) 963 7941
Training - email	training@adtran.com

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Chapter 1 Introduction

PRODUCT OVERVIEW

The ADTRAN DSU 56/64, shown in Figure 1-1 on page 1-2, is a technologically advanced, high performance Data Service/Channel Service Unit (DSU/CSU) that provides the interface between telco provided Digital Data Service (DDS) and the customer's Data Terminal Equipment (DTE).

The DSU 56/64 supports both 56 kbps and 64 kbps loop service rates with the DTE interface rate matching the selected loop rate. A synchronous V.35 interface is provided for the DTE interface.

All setup or configuration is accomplished with a single eight-position DIP switch that is accessible from the back panel of the unit.

FRONT PANEL

As shown in Figure 1-1, the front panel of the DSU 56/64 contains eleven light emitting diode (LED) indicators that display DTE interface, network, and test status. These indicators are defined in the LED Identification section, below.
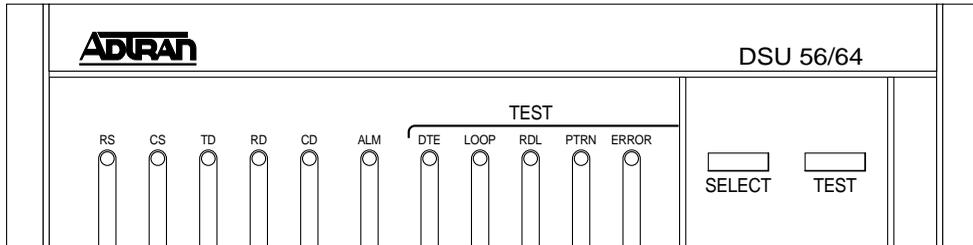

Figure 1-1. DSU 56/64 Unit

LED Identification

DTE Status (Green)

Indicator	Definition	Source
RS	Request To Send	DTE
CS	Clear To Send	DSU
TD	Transmit Data	DTE
RD	Receive Data	DSU
CD	Carrier Detect	DSU

> **NOTE**
>
> *The active state for the status indicators (RS, CS, and CD) is On while the on state for the data indicators (TD and RD) represents a Space condition.*

Network Status (Red)

ALM	**ON** indicates a problem on the local loop or within the DDS network.
	OFF indicates normal loop and network conditions.

Test Status/Error (Yellow/Red)

DTE	**ON SOLID** indicates DTE interface test in progress. **FLASHING** indicates Loop Interface test (CSU Loop-back) has been initiated by telco.
Loop	**ON SOLID** indicates loop interface test has been initiated from local DSU. **FLASHING** indicates loop interface test (CSU or DSU Loopback) has been initiated by telco.
RDL	**ON SOLID** indicates remote digital loopback test has been initiated from the local DSU. **FLASHING** indicates remote digital loopback test has been initiated from the remote DSU.
PTRN	**ON SOLID** indicates that integral pattern generator is being utilized for testing.
Error	**ON** indicates that errors are being detected during a test or that a test can not be properly initiated.

Tests defined by the above indicators are explained in greater detail in Chapter 3, *Test Modes* on page 3-1.

Test Switches

The front panel also contains two push-button switches for selecting and controlling the various test modes for the DSU 56∕64. The descriptions of these switches are as follows:

Select	Each time this switch is activated, a valid test mode is indicated by one or more LEDs being turned on solid. Pressing the **SELECT** button from within an active test injects a bit error.
Test	Once the desired test mode is displayed on the test status indicators, the test is initiated by activating this switch. Pressing the **TEST** button again will terminate any test in progress.

REAR PANEL

The rear panel of the DSU 56⁄64 is shown in Figure 1-2.

PRIMARY V.35, a thirty-four pin connector, provides the synchronous DTE interface.

The eight-pin modular jack (RJ-48S) labeled **TELCO** connects the DSU 56⁄64 to the DDS network.

For pinouts to these connectors, see Table A-1, *Pinouts for RJ-48S Network Connections,* on page A-1 and Table A-2, *V.35 DTE Pinouts,* on page A-2.
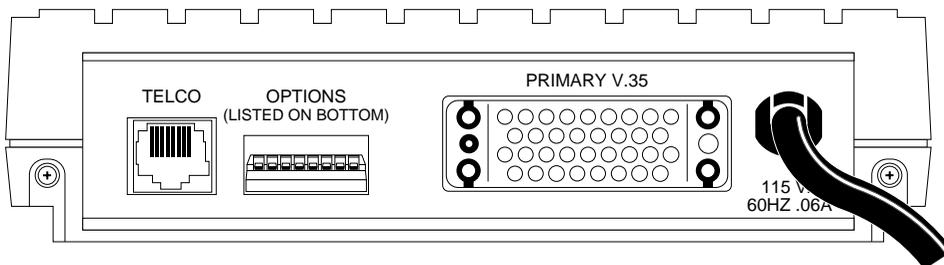

Figure 1-2. DSU 56/64 Rear Panel

All setup or configuration parameters for the DSU 56⁄64 are selected with an eight-position DIP switch. This switch, labeled **OPTIONS**, is accessible from the rear panel. The label also references the options chart located on the bottom of the unit. The individual options are explained in detail in Chapter 2 in the section *Configuration* on page 2-2.

The power cord on the rear panel of the DSU 56⁄64 is mechanically secured to the back panel and provides the connections to the integral AC⁄DC power supply.

Chapter 2 Installation

UNPACK, INSPECT, POWER UP

Carefully inspect the DSU 56/64 for any shipping damages. If damage is suspected, file a claim immediately with the carrier and then contact ADTRAN Customer and Product Service (CAPS). If possible, keep the original shipping container for use in returning the unit for repair or for verification of damage during shipment.

Contents of Shipping Package

The following items are included in ADTRAN shipments of the DSU 56/64:

- The DSU 56/64 unit
- Network interface cable
- An 8-position modular to 8-position modular cable
- The DSU 56/64 User Manual

Customer Provides

- V.35 cable

Power Up

The DSU 56/64 is equipped with a captive six-foot power cord that is terminated with a three-prong plug for connecting to a grounded power receptacle.

NOTE   *Ensure that a grounded, 115 VAC, 60 Hz receptacle is used for powering the DSU 56/64 unit.*

CONFIGURATION

The DSU 56/64 has eight options for controlling the operation of both the network and DTE interfaces. These options are selected by setting individual switches on either position DIP switch that is accessible from the rear panel. A chart showing the options and switch settings is attached to the bottom of the unit.

Clear To Send (CS) - SW 1

Down - Normal
In the down position, CS follows the RS lead with the selected amount of delay. The only exceptions to this occur when network or test conditions prevent data from being transferred over the DTE interface. During these conditions CS is turned off.

Up - On
CS is forced on all the time.

Clear to Send Delay (CS Delay) - SW 2

Switch Position
RS to CS Delay

Down - Short
250 µs ± 125 µs

Up - Long
10 ms + 125 µs

Antistream - SW 3

The Antistream option is used to select the antistream time out. The antistream time out is the maximum time the DSU 56/64 is allowed to transmit data from the DTE into the network. This feature prevents one DTE device on a multi-drop network from continuously tying up the transmit circuit from a remote DSU back to the master DSU.

The antistream timer is reset to zero when RS transitions to the active state and is updated every second while RS is active. When the antistream time out expires, the DSU 56/64 stops transmitting DTE data into the network. It does, however, continue to accept data. CS is maintained in the active state until the DTE deactivates the RS input.

Down - Off
The Antistream timer is disabled.

Up - On
The Antistream timer is enabled and set for 45 +/- 0.5 seconds.

Carrier Detect (CD) - SE 4

Down - Normal
CD is on any time customer data is being received and off when the receive circuit is idle, not carrying customer data.

Up - On
CD is forced on all the time.

Data Set Ready (SR) - SW 5

Down - On
SR is forced on all the time.

Up - Normal
SR is only turned off when the network is out of service or a test is in progress.

Remote Digital Loopback (RDL) - SW 6

Down - Enable
The DSU 56/64 accepts the industry standard V.54 RDL command from the far end of the circuit.

Up - Disable
The DSU 56/64 does not respond to the V.54 loopback command from the far end of the circuit.

Loop Rate - SW 7

Down - 56 Kbps
The network interface of the DSU 56/64 is configured for operation at 56 kbps.

Up - 64 kbps
The network interface is configured for 64 kbps operation.

Scrambler - SW 8

For 64 kbps clear channel operation, there is a possibility that the DTE data sequenced might mimic network loop maintenance functions and erroneously cause other network elements to activate loopbacks. To prevent this, the Scrambler switch should be set to the Down (On) position.

The **SCRAMBLER ON** option must be set the same for both the local and remote 56/64 DSUs for the situation described above.

The option is only valid when the 64 kbps rate is selected.

Down - On
The scrambler is enabled.

Up - Off
The scrambler is disabled.

Table 2-1. Default Option Switch Settings

Switch	Position	Setting
1	Down	Clear to Send (CS) Normal
2	Down	CS Delay Short
3	Down	Anti-stream Timer Off
4	Down	Carrier Detect (CD) Normal
5	Up	Data Set Ready (SR) Normal
6	Down	Remote Digital Loopback (RDL) Enabled
7	Down	Loop Rate 56 Kbps
8	Down	Scrambler Enabled

NETWORK CONNECTIONS

This interface consists of four leads that are paired to provide separate transmit and receive circuits. The four leads are provided on the eight-position modular jack DSU RJ-48S labeled **TELCO** on the rear panel of the DSU 56/64.

The pinouts for this connector are shown in Table A-1 on page A-1.

DTE CONNECTIONS

The Data Terminal Equipment (DTE) is attached to the connector labeled **PRIMARY V.35** at the rear of the DSU 56/64.

The pinout for the V.35 DTE connector is shown in Table A-2 on page A-2.

CAUTION

A shielded V.35 cable is required to prevent possible radio frequency interference emissions.

Chapter 3   Test Modes

In addition to a self-test mode, the DSU 56/64 has other extensive test modes which are designed to help isolate problems to specific components of the communications circuit. These various test modes for the DSU 56/64 are initiated and terminated from the front panel using the **SELECT** and **TEST** buttons.

SELF TEST

A self-test goes through the following cycle.

1. When the DSU 56/64 is powered on, all LEDs on the front panel turn on simultaneously for approximately two seconds.

2. After two seconds, all the LEDs turn off briefly.

3. The LEDs then cycle on in pairs with a fan-out pattern away from the **ALM** indicator.

4. Next, the LEDs cycle off in pairs with a fan-in pattern back towards the **ALM** indicator.

These patterns are repeated four times for visual verification that all LEDs are functioning properly.

At the completion of the LED test patterns, the **PTRN LED** is on, which indicates that the DTE with TP test is being performed.

If the test is successful, the **ERROR** indicator does not turn on.

If the **DTE WITH TP** test fails, the **RS**, **ALM**, **DTE**, **PTRN**, and **ERROR** indicators all flash.

If an **EPROM CHECKSUM** failure is detected during self test, **CS**, **ALM**, **PTRN**, and **ERROR** indicators all flash at the end of the self test.

NEAR END TESTS

The local DSU 56/64 can perform the following near end tests:

- DTE Only
- DTE with Test Pattern
- DTE and LOOP (LL)
- Loop Only (RT)

DTE ONLY TEST

The **DTE ONLY** test can test both the DTE interface of the local DSU 56/64 plus its loop transmitter and receiver. For this test, the loop transmit data is connected to the loop receive data at a point close to the physical network interface.

The loopback point and the signal paths for this test are shown in Figure 3-1.
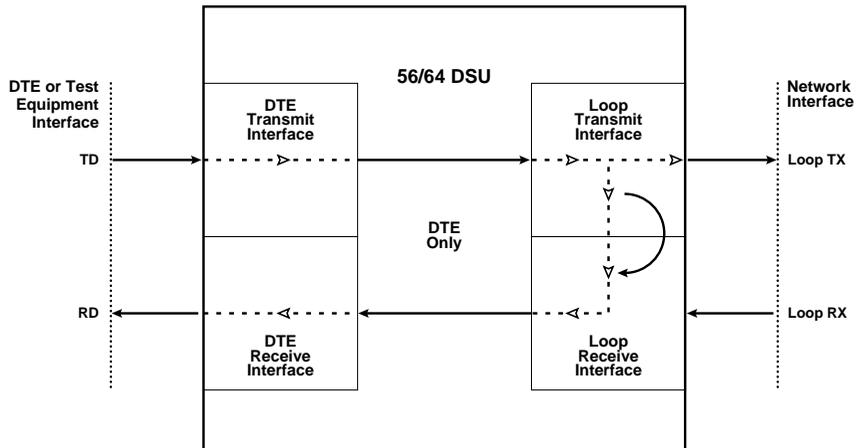
Figure 3-1. DTE Only Test Diagram

To initiate the **DTE ONLY** test, perform the following steps:

1. Press **SELECT** once to turn on the DTE test indicator.
2. Press **TEST** while the test indicator is on.
3. To terminate the test, press **TEST**.

Test data from the terminal or test equipment is routed through the DTE section of the DSU 56/64 and then to the output of the loop transmitter section where the signal is encoded for transmission. The output of the loop transmitter is coupled back to the loop receiver input. The received test signal is then decoded and returned to the terminal or test equipment where it is checked for any bit errors.

DTE WITH TEST PATTERN (TP)

The **DTE WITH TP** test is similar to the **DTE ONLY TEST** described in Figure 3-1 on page 3-2. It is initiated at the local DSU 56/64 and is used to independently test the operation of the DSU 56/64.

To initiate the **DTE WITH TP** test, perform the following steps:

1. Press **SELECT** twice to turn on both the DTE and PTRN test indicators.
2. Press **TEST** while these test indicators are on.
3. To terminate this test, press **TEST**.

Instead of using data from the terminal or test equipment, this test utilizes an internal test pattern generator and detector in the DSU 56/64. The loopback point and the data paths for this test are illustrated in Figure 3-2 on page 3-4.
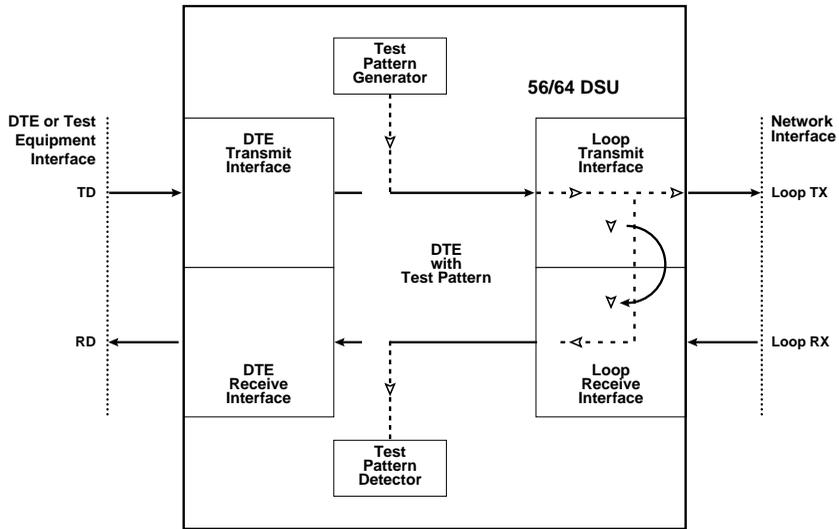
Figure 3-2. DTE with TP Test Diagram

The internal test pattern generator and detector of the DSU 56/64 operate with a 2047 data pattern. When this test is initiated, the test pattern detector examines the receive data stream until synchronization to the 2047 pattern occurs. Once synchronized, the detector continues to check the receive data and reports any detected bit errors by turning on the **ERROR** LED.

Once a test is initialized with the internal test pattern generator and detector, errors can be injected into the transmit data stream by pressing **SELECT** and observed by watching the **ERROR** LED turn on for a brief period of time. As previously mentioned, the **DTE WITH TP** is automatically performed during the self-test sequence for the DSU 56/64.

DTE AND LOOP TEST (LL)

This test is initiated at the local DSU 56/64 and allows independent testing of the separate sections of the DSU 56/64. This includes testing of the local DTE interface with data from the terminal or test equipment and testing of the loop interface section of the local DSU

56/64 from the remote site over the actual communications circuit. Testing from the remote end of the circuit is performed with test data generated by the remote DSU or terminal type test equipment.

The **DTE AND LOOP** test splits the DSU 56/64 into separate DTE and Loop interface sections and then loops the transmit data of each interface back to its respective receive data. Figure 3-3 illustrates the loopback points and the signal paths for this test. The **DTE AND LOOP** LEDs flash during initialization of the test and turn on solid once the test is in progress.

56/64 DSU

DTE or Test Equipment Interface

Network Interface

DTE Transmit Interface

Loop Transmit Interface

TD

Loop TX

DTE and Loop

RD

Loop RX

DTE Receive Interface

Loop Receive Interface
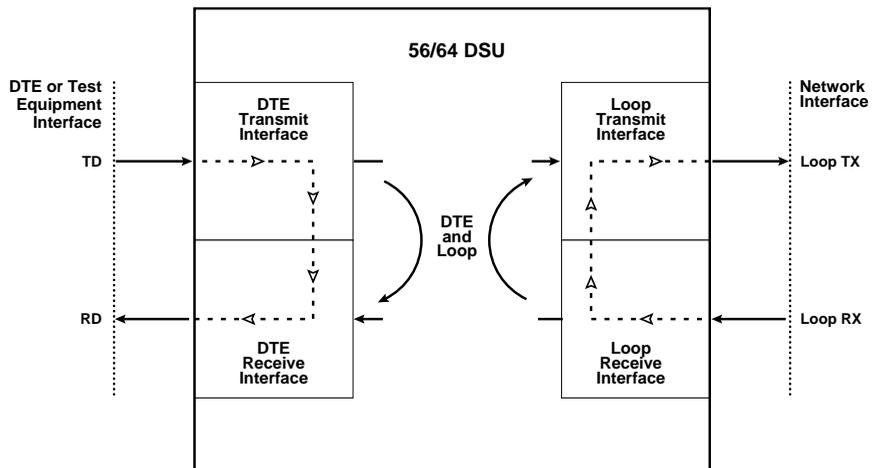
Figure 3-3. DTE and Loop Test Diagram

To initiate the **DTE AND LOOP** test, perform the following steps:

1. Press **SELECT** three times to turn on both the **DTE AND LOOP** test indicators.
2. Press **TEST** while these test indicators are on.
3. To terminate this test, press **TEST**.

LOOP ONLY TEST (RT)

The **LOOP ONLY** test or **REMOTE LOOPBACK** test (RT) is used to test the loop interface and a major portion of the DTE interface of the local DSU 56/64 from the remote site over the actual digital data circuit.

For the **LOOP ONLY** test, the network receive data is looped to the network transmit data inside the DTE interface section of the DSU 56/64. The physical DTE interface is ignored for this test. The **LOOP** LED flashes during initialization of the test and turns on solid once the test is in progress. Figure 3-4 illustrates the loopback point and the signal paths for this test.
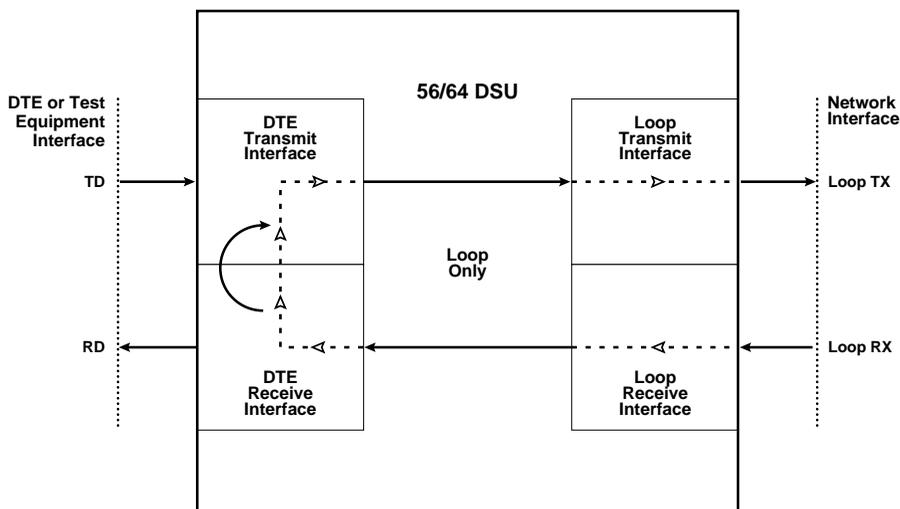
Figure 3-4. Loop Only Test Diagram

To initiate the **LOOP ONLY** test, perform the following steps:

1. Press **SELECT** four times to turn on the **LOOP** test indicator.
2. Press **TEST** while this test indicator is on.
3. To terminate this test, press **TEST**.

FAR END TESTS

Remote Digital

When the **RDL** test is initiated at the local DSU 56/64, it commands the remote DSU into loopback with the industry standard V.54 loopback pattern. The loopback point and the signal paths for the remote DSU are the same as the **LOOP ONLY** test for a local DSU, shown in Figure 3-4 on page 3-6. This Loopback test is performed with data from the terminal or test equipment. The RDL LED flashes during initialization of the test and turns on solid once the test is in progress.

To initiate the **RDL** test, perform the following steps:

1. Press **SELECT** five times to turn on the **RDL** test indicator.
2. Press **TEST** while this test indicator is on.
3. To terminate this test, press **TEST**.

RDL with Test Pattern (TP)

When the **RDL WITH TP** test is initiated at the local DSU 56/64, the local DSU commands the remote DSU into loopback with the industry standard V.54 loopback pattern. The loopback point and the signal paths for the remote DSU are the same as the **LOOP ONLY** test for a local DSU; see Figure 3-4 on page 3-6. This **LOOPBACK** test is performed with data from the internal test pattern generator and error detector. The **RDL** and **PTRN** LEDs flash during initialization of the test and turn on solid once the test is in progress.

To initiate the **RDL WITH TP** test, perform the following steps:

1. Press **SELECT** six times to turn on both the **RDL** and **PTRN** test indicators.
2. Press **TEST** while these test indicators are on.
3. To terminate this test, press the **TEST** switch.

Test Pattern (PTRN)

When the **PTRN** test is initiated, the local DSU 56/64 uses the integral test pattern generator to transmit a standard 2047 test pattern to the DSU on the far end of the circuit. The local DSU 56/64 then examines the received data for the standard 2047 pattern. Once this pattern is detected and synchronization is achieved, the **ERROR** indicator is turned off. The **ERROR** indicator turns on when errors in the receive data pattern are detected. While this test is active, errors can be injected into the transmit data stream by pressing the **SELECT** push-button. The **PTRN LED** flashes during initialization of the test and turns on solid once the test is in progress.

To initiate the **PTRN** test, perform the following steps:

1. Press **SELECT** seven times to turn on the **PTRN** test indicator.
2. Press the **TEST** switch while this test indicator is on.
3. To terminate this test, press **TEST**.

REMOTE TESTS

The DSU 56/64 responds to three remotely activated tests.

• Remote Digital Loopback (RDL)
• CSU Loopback (LL)
• DSU Loopback (RT)

The **RDL** test is initiated by a remote DSU and causes the local DSU 56/64 to loopback. The loopback point is the same as the loop only point. See Figure 3-4 on page 3-6. This test is run to test the end-to-end performance of the circuit.

Both the **CSU LOOPBACK** and the **DSU LOOPBACK** tests are activated from the telephone company diagnostic test equipment and are used to isolate trouble on a circuit.

The **CSU LOOPBACK**, commonly called the **LL** test, has the same loopback points as the **DTE AND LOOP** test. It is used by the telephone company to test the integrity of the local loop.

The **DSU LOOPBACK**, commonly called the **RT** test, has the same loopback point as the **LOOP ONLY** test and is used by the telephone company to test the operation of both the local loop and DTE interface sections.

Appendix A   Pinouts

Table A-1. Pinouts for RJ-48S Network Connections

Pin Number	Function	Signal Direction
1	Transmit Data (R)	From Customer to Network Interface
2	Transmit Data (T)	From Customer to Network Interface
3-6	Not Used	N/A
7	Receive Data (T-1)	From Network Interface to Customer
8	Receive Data (R-1)	From Network Interface to Customer

Table A-2. V.35 DTE Pinouts

Pin	CCITT	Description
A	101	Protective Ground
B	102	Signal Ground (SG)
C	105	Request to Send (RS)
D	106	Clear to Send
E	107	Data Set Ready (SR)
F	109	Receive Line Signal Detector (CD)
R	104	Received Data (RD-A)
T	104	Received Data (RD-B)
V	115	Receiver Signal element Timing (SCR-A)
X	115	Receiver Signal Element Timing (SCR-B)
P	103	Transmitted Data (SD-A)
S	103	Transmitted Data (SD-B)
Y	114	Transmitter Signal element Timing (SCT-A)
AA	114	Transmitter Signal element Timing (SCT-B)
U	113	External TX Signal element Timing (SCX-A)
W	113	External TX Signal element Timing (SCX-B)

Appendix B   Specifications

SPECIFICATIONS AND FEATURES

The DSU 56/64 is a single stand-alone unit designed to be used either on a desktop or mounted on a wall.

This section describes the standard specifications and features incorporated in the DSU 56/64.

Loop Interface
• 4-wire, full duplex

Line Requirements
• Local loop specifications per AT&T Pub 62310

Loop Rates
• 56 kbps or 64 kbps

Receiver Sensitivity
• -45 dB

DTE Interfaces
• V.35 synchronous

DTE Operating Modes
• Full or half duplex

DTE Data Rates
• 56 kbps or 64 kbps synchronous

Diagnostics
Network test center activated:
- CSU loopback on sealing current reversal in local loop
- DSU loopback

User activated:
- Self test,
- Local loopback,
- V.54 activated remote loopback with 2047 test pattern
- DTE data/data from external test set

Power
- 115 VAC
- 4 Watts (maximum)

Environment
- Operating Temperature: 0° C to 50° C (32° F to 122° F
- Storage Temperature: - 20° C to 70° C (-4° F to 158° F)
- Relative Humidity: Up to 95%, non-condensing

Hardware Specifications
- Dimensions: 1.56 inches H, 6.50 inches W, 8.32 inches L
- Weight: 1.5 pounds

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